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Applicability of Cloud Computing in Education: A contemporary overview in Indian Perspectives

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Abstract: The advancement of our coeval society, information and technology of our knowledgeable society depends on technology advancement that has long been based on the increasing performance of different devices concurrently. The intention of modern computing technology solutions miniaturized is the segregation of its entire computing power in a single device and it must be an external source, which allowed the uprising of cloud computing. This abstract introduces the objective and intended contribution of the research. The technology involves a number of benefits to its users, evidenced by its adoption by institutions that have succeeded to reduce their equipment costs and maintenance. The outsourcing all facilities that a computer can offer complement the idea of reducing costs and not accidentally is useful in education. The cloud solutions allow the teaching, research and development to be more efficient and sustainable which makes as the educational institutions to consider adopting these solutions.

Keywords: Cloud computing, cloud based e-learning, platform, Infrastructure, security, trackability, collaboration.

1. INTRODUCTION

With the rapid advancement of technology and the development of emerging technologies such as cloud computing, the issues of reach and quality are addressed by enabling low cost implementation of IT tools. Remote classrooms enabled by the cloud will help us in running multiple classrooms through a small group of teachers and will help conquer the problem of lack of skilled teachers. In addition, it will also directed to standardisation of course contents and education offering methods. The India Vision 2020 document, by the Planning Commission of India, lays a largecharacteristics on higher education. Cloud can play a burdensome role in offering higher education by being an innovative platform for classroom lectures, using streaming on the web. Provided that cloud-enabled technologies can conquerstudents' data privacy-related concerns and if the network bandwidth becomes available at every portal, cloud can lay down a solid foundation for a transformational journey of the education system in India. The cloud computing technology should be obtained in all areas of society and in education. The e-learning solutions based on the cloud promote a new age of learning, in which the lectures and labs are based on cloud platform through virtualization. A variety of knowledge can be made available to all teachers and students through cloud-based services and these services can be accessed anytime, anywhere and also on any device. On the other hand, providing educational services through cloud computing technology enables them to gain the skills needed in the global information society. Many institutions have begun to agree to this initiative and there is precedent of a significant reducing in costs as a result of implementing cloud solutions. For education, the approach of cloud computing technology is based on the services they offer, their implementation and architecture. Thus, from this point of view of these services, can be mentioned:

- Platform as a service (PaaS) that provides a range of software for the development of programs;
- Software as a service (SaaS), so users access cloud software provided by cloud administrators whosupervise them;
- Infrastructure as a Service (IaaS) that is the base model in Cloud Computing.

After the method of implementation, the cloud can be public, private or hybrid. Microsoft Company already works in the area of Cloud Computing using Windows Azure, which is made available to users as PaaS and IaaS This service is implemented as a Public Cloud. From the point of view of learning technologies, web based learning offers several advantages over the conventional classroom learning. The biggest advantage is related to the low cost and use learning content anytime and anywhere. Learning material is easily maintained and updated; it may include multimedia content to facilitate understanding of concepts. Student-centered approach and the teacher creativity in making the learning material are encouraged. Uses of cloud in education some institutions use low-level cloud services for data storage but the use of cloud computing in education.

There was a time when, to use files like MS Word, Excel etc. on different computers, we needed to save our files on anexternal storage drive likeCompact Disk. The disk then travelled with us so that we could load our information onto other computers while holding our breath until the document was actually retrieved,not any longer. The safety, stability, and ease-of-use of cloud computing in education is resulting in widespread adoption in educational institutions of all sizes and types.

2. CLOUD AND ITS TYPES

- Cloud Computing is the use of computing resources both hardware and software, that are delivered as a service over the Internet. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams.
- Cloud computing has four types based on the deployment. Theseare:
- Private cloud which deals with the delivery of cloud services to a restricted set of consumers, usually within a single organization.
- Public cloud that is concerned with the delivery cloud services to a relatively unrestricted set of consumers.
- Community cloud which handles cloud infrastructure shared by several organizations and supporting a specific community that has shared concerns.
- Hybrid cloud that is a composition of two or more

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clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

Figure 1 shows the Cloud Computing Architecture.

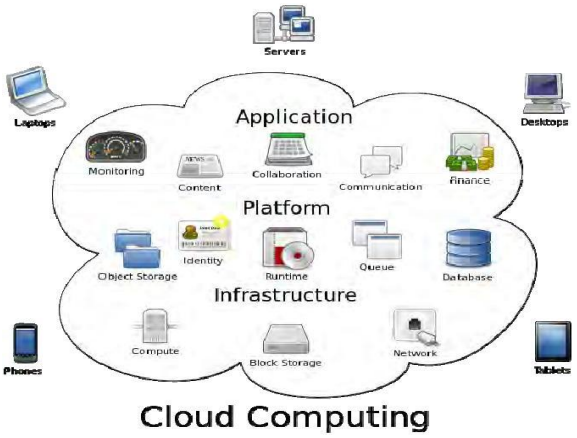

Fig 1: Cloud Computing

3. Why weuse Cloud for storing information?

Are there really any true advantages in education for storing information off-site on a server that could be located anywhere? A recent conversation about cloud computing with several IT professionals of the educational field, there has some significant advantagesfor storing information in Cloud:

(i) **No carrying any devices:** Such as pen drives or CDs. We don't need to worry about losing and breaking these devices, or not having our information load properly.

(ii) **Easy access:** Notes, lesson plans, lab work– just about anything digital that we use in teaching iseasily uploaded and accessed anytime.

(iii) **Stability:** cloud computing is now to the point of being a very stable technology that we can really on.

(iv) **Security:** Our data, content, information, images and any types of data, we store in the cloud usually requires authentication. For example, ID and password.So, it is not easily accessible by anyone.

(v) **Shareability:** Working on an instructional assignment with other teachers, we can share some or all of our files that we have stored in the cloud. No more obtaining any thumb drive or burning another CD or DVD. We just need to send a link to the file(s) for destination.

(vi) **Trackability:** Make changes to a lesson and want to change it back? No problem. Cloud computing will save multiple revisions and versions of a document so that we can chronologically trace back the evolution of an item.

(vii) **Collaboration:** We can set-up various student groups to work on projects and assignments in the cloud.

(viii) **Good-bye copier:** With cloud computing, the amount of photocopying is reduced significantly – even more so if each student has their own smart device (computer, laptop, tablet, etc.). Quizzes, tests, assignments all can be taken, scored, shared with student and parents, and stored.

(ix) **Good-bye file cabinets!** With cloud computing abundance, there is no longer the need to both save files digitally as well as in paper format. Cloud computing systems are regularly backed-up, so the chances harmfulness of contents are quite small. No more file cabinets means more classroom space for us and our students.

Figure 2 shows the Cloud Architecture for Education.

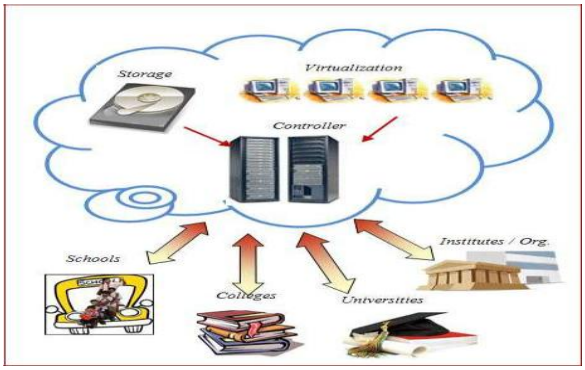

Fig 2: Cloud Architecture for Education

Figure 3 shows the Cloud Service Model used in education system.Following figure shows the Cloud Deployment Model.

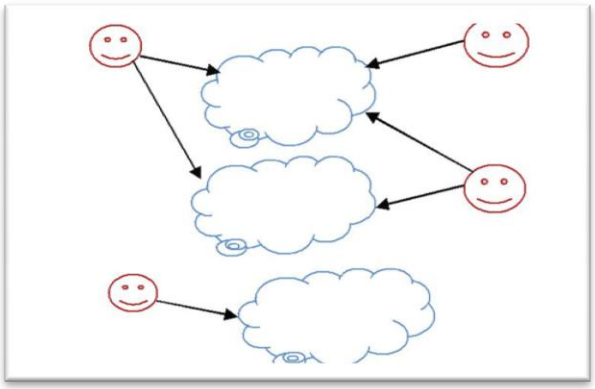

Fig 3:Cloud Deployment Model.

4. CHALLENGES

- The course curriculum in most institutes is not updated regularly in line with global developments. Reach of quality education in remote villages has traditionally been low. Lack of internet presence in such areas has been a bottleneck.
- Inflating cost of education has led to layoffs of teaching staff and increasing class size thus increasing the student to teacher ratio to unimaginable levels. Additionally,there is dearth of qualified teachers in the country.
- Teachers and educational institutions have not been technology savvy traditionally; hence the adoption of new technologies has been slow.

5. BENEFITS OF CLOUD ADOPTION

- **Standardisation of content:** Courses delivered overcloud through a central location will guide to a

standard content delivered to multiple remote virtual classrooms of many Institutions.

- **Alliance:** Teachers and Students can alliances on theirstudies, projects etc.
- **Swiftness to rollout new courses:** Cloud-enabledtechnologies ensure rapid access to infrastructure services thereby provideswiftness in rolling out newer products.
- **Improved managerial efficiency of Institutions:** Teachers and the academicstaffs canfocus on the core functions of their institution instead of fruitless efforts on IT infrastructure and the applications set-up.
- **Superior quality of education delivered anytime, anywhere: U**pdated contents of Courses can bedelivered customarilyacross all locations.
- **Measurability:** Measurable systems on cloud is provide bigdata platform for research and analysis.

6. CLOUD COMPUTING IMPACT AREAS

The following table represents the different impact areas of cloud computing:

Table1:Cloud Computing Areas

Classroom technologies	
Interactive engagement	Centralised faculty assisted by local teachers. Teachers interacted with students, delivering lectures, presentations or response their questions.
Alliance	Students and teachers Alliancing on their projects by creating and sharing contents and communicate with each other by message or video.
Portability	Extend classrooms and labs with mobile devices like smart phones, tablets, virtual class room technologies facilitate remote access.
True-time assessment	Adapting lessons based observations of student interactions and class notes taken by them. Content should be highlighted, footnote or updated via electronic media
Managerial technologies	
Customer Relationship Management .	Student life-cycle management enables better management of admissions, recruitment, financial aid and billing, student records and performance, transfers and alumni relationship etc.
Enterprise Resource Planning	Educational institutions manage internal and external resources including physical assets, and resources like financial and human.
Business intelligence	Teachers and students use analysis and evaluating in classrooms; also establishing their curriculum.
Smart campus	The Chief Information Officer is responsible for public safety, transportation, energy and water management, building maintenance, student services.

7. THE INDIAN IAAS MARKET

At present, the Indian market does not have a mature ecosystem that supports cloud IaaS services. A few players from the service provider segment such as Tata Communications, Wipro and NetMagic have announced services that are likely to evolve into more stable cloud offerings. Some of the challenges the market currently faces include:

- ❖ Ecosystem maturity
- ❖ Customer awareness of services
- ❖ Connectivity

8. SECURITY

In this digital world where users are getting benefits of services beside that they always worry about their security. User has a satisfaction from cloud services that security against back-up, power failure, hard-disk damage, system crash but the data leakage or data access to the third party is still a question in front of them. Thus Data Security is the main concern. End Users think that the access from remote server whose location is also not known to them, in spite of that data is more secure if it is hosted under them.

The more sensitive data includes exams papers, employees' accounts, research results, students' academic records and much more in the institutes, universities, schools pays an important attention to take the data security steps. Education sector should follow the various steps that come under data security which are as follows as:

(i) There are several strict Data Protection laws and legal policy contract under which restriction ofaccessing data to third party are signed between the service provider and the end users. Law makers also started to mark the legal issues that denotethe privacy and data security protection.

(ii) Data encryption should be done against the unauthorized access in the cloud. Data may be encryptedafter the request and before delivering it into the cloud environment.

(iii) Mask or de-identify the sensitive data to achieve the data security.

(iv) Should take care of the firewalls which are the main source of knowing the data location.

(v) Adoption of private cloud by the organization is a great source of data security. High sensitive data should be kept inside the institute and let other data to be externalize to achieve scalability and other benefits of cloud computing.

(vi) Technologies like HTML5 allow users to work offline when internet access is intermittent.

(vii) The contract should be read carefully by the institutes. They should seek legal advices before signing on the contract. Several issues should be examined such as initial term of contract, present and future costs, penalties, data access security; should becompensation restricted under the contract expansion.

9. CONCLUSION

Cloud computing is growing rapidly in terms of computing services, resource utilization (hardware and software) or in other words Cloud is floating with huge data inside it with virtualization over the internet. It has a wide scope in education sector. Where Students are looking more interested in electronic gadgets as a great source of communication, Cloud Computing will be a welcome step in their life. Instead of keeping textbooks and heavy bags with them, they will prefer a world without

textbooks having much more efficient way to store and access the lectures, assignment, research paper and virtual class etc. Let them give a chance to touch the sky limits via cloud for their future development in this competition era.

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